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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,536	09/15/2003	Jean Joseph Botti	DP-300006	2268
22851	7590	06/21/2006	EXAMINER	
DELPHI TECHNOLOGIES, INC.			WALTERS, JOHN DANIEL	
M/C 480-410-202			ART UNIT	
PO BOX 5052			PAPER NUMBER	
TROY, MI 48007			3618	

DATE MAILED: 06/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/662,536	Applicant(s) BOTTI ET AL.	
	Examiner John D. Walters	Art Unit 3618	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2006.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,3,6,7,10-12,15,18,19,22 and 23 is/are pending in the application.  
4a) Of the above claim(s) 18,19,22 and 23 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1,7,10-12 and 15 is/are rejected.  
7) ☒ Claim(s) 3 and 6 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 05 August 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

Claims 1, 3, 6, 7, 10 – 12, and 15 have been examined. Claims 18, 19, 22 and 23 have been withdrawn via election of species. Claims 2, 4, 5, 8, 9, 13, 14, 16, 17, 20, 21, 24, and 25 have been canceled by Applicant.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 7, 10 – 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rae (3,040,519) in view of Manikowski (5,706,675), Houseman (4,041,910) and Houseman (3,982,910). Rae discloses an extended rich mode engine having an intake and an exhaust, said extended rich mode engine configured to produce a substantially continuous optimized hydrogen rich engine exhaust (see claim 6).

Regarding the term “optimized” in recited claim 1, note also that lines 8 and 9 of page 9 of the specification recites “The present system and method optimizes (increases) the hydrogen content of the engine exhaust”. From this, the word “optimizes” merely means any increase in the hydrogen content of an exhaust above stoichiometric. Note this is consistent with a “hydrogen rich exhaust”.

Regarding claim 7, note that since the fuel is burned internally, as opposed to externally, such as in a steam turbine, where fuel is "burned" in a boiler or nuclear reactor, that the engine of Rae is an "internal combustion engine".

Regarding claims 10 and 15, note that the fuel is burned as a result of compression, as opposed to being ignited with a spark plug.

Rae does not disclose an oxygen enrichment device having an oxygen stream effluent with said engine intake wherein said oxygen enhancement device is any of a number of varieties listed within claim 1.

Manikowski, however, discloses a high efficiency oxygen/air separation system in which an oxygen air separator (Fig. 2, item 53) is which has an oxygen stream in fluid communication with an engine intake (Fig. 2, item 67). It would have been obvious to one of ordinary skill in the art at the time of applicant's invention in order minimize or eliminate NO<sub>x</sub> and greatly reduce Carbon monoxide and soot emissions (column 4, lines 15 – 18).

Rae in view of Manikowski does not disclose the use of spark ignition for their internal combustion engine. Houseman ('1,910) teaches an extended rich mode tractive engine, i.e. an engine practical for an automotive application (column 2, line 11), having an intake and an exhaust, said extended rich mode engine configured to produce a substantially continuous optimized hydrogen rich engine exhaust. Said engine includes spark plugs (column 3, line 62).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to combine the spark ignition of Houseman with the engine system

of Rae in view of Manikowski in order to allow said engine to generate extra power and form  $H_2$  and CO within the cylinders using spark ignition (bottom of column 3 and top of column 4).

Rae in view of Manikowski and Houseman ('1,910) fail to teach that the combined concentration of hydrogen and carbon monoxide is greater than about 30% of the engine exhaust running in the fuel rich condition.

However, Houseman ('2,910) teaches a gas generator that generates a hydrogen rich exhaust (abstract) that is utilized in a lean engine (91 – Figure 8) that has a concentration of carbon monoxide and hydrogen, by volume, at an air fuel ratio of 7:1 of approximately 38% (Figure 3 – by adding ordinate values for CO and  $H_2$  at an abscissa value of 7). A hydrogen and carbon monoxide exhaust concentration by volume of greater than 30% is advantageous in that the hydrogen rich exhaust concentration percentages of Houseman ('2,910) may be used as fuel in the lean cylinders of Houseman ('1,910) to promote fuel efficiency and reduce emissions.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of applicant's invention to utilize a hydrogen rich exhaust with the concentration of hydrogen and carbon monoxide in excess of 30% in the hydrogen rich exhaust of Houseman ('1,910) as taught by Houseman ('2,910).

***Allowable Subject Matter***

Claims 3 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

Applicant's arguments with respect to claims 1, 7, 10 – 12 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Applicant states, "Claim 6, however, requires that the fuel is hydrogen..."

As noted in the above rejection, Rae also discloses that the use of gasoline, i.e. a hydrocarbon fuel, is suitable in this application.

Applicant also states, "...Houseman 3,982,910 reference relates not to a tractive power-producing engine..."

Houseman ('2,910) specifically states, "Yet another object of this invention is the provision of a portable hydrogen-rich gas generator suitable for use with an automobile internal combustion engine." An automotive ICE, as shown in Houseman ('1,910), clearly produces tractive power.

For these reasons, the rejections stand.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John D. Walters whose telephone number is (571) 272-8269. The examiner can normally be reached on Monday - Friday, 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Ellis can be reached on (571) 272-6914. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John D. Walters  
Examiner  
Art Unit 3618

JDW

A handwritten signature consisting of the letters 'JDW' in a cursive, stylized font, enclosed within a circular loop.A handwritten signature in a cursive, stylized font, appearing to be 'CPE', written with dark ink.

CHRISTOPHER P. ELLIS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3600